Claims

1. A method for rapid homogenisation of reaction mixtures with respect to temperature and chemical concentration, the reaction mixture being placed in a vessel suitable for centrifugation, and subjected to asymmetric heating, cooling and simultaneous centrifugation, **characterized** in that said asymmetric heating and cooling consists in the creation of a temperature difference between subsets of said reaction mixture, and the centrifugation is performed at conditions sufficient for creating an enhanced flow within said reaction mixture, wherein said flow ensures practically total mixing and homogenisation of the reaction mixture.

2. The method according to claim 1, wherein the asymmetric heating and cooling consists of the walls of the reaction vessel being cooled, while a portion of the reaction mixture is heated.

3. The method according to claim 1, wherein the central portion of the reaction mixture is heated while the walls of the reaction vessel are being cooled.

4. The method according to claim 1, wherein the reaction mixture is subjected to a centrifugal force exceeding 500 x g.

5. The method according to claim 1, wherein the reaction mixture is subjected to a centrifugal force in the interval of about 500 to about 20.000 x g.

6. The method according to claim 1, wherein the reaction mixture is subjected to a centrifugal force in the interval of about 1.500 to about 20.000 x g.

7. The method according to claim 1, wherein the reaction mixture is subjected to a centrifugal force in the interval of about 5.000 to about 15.000 x g.

8. The method according to claim 1, wherein the heating of a subset of the reaction mixture is performed by a method of heating chosen among an IR-source, and a microwave element.

9. The method according to claim 2 or 3, wherein the cooling of the walls of the reaction vessel is performed by convection cooling or the use of a circulating cooling medium.

10. A method for enhancing mass transport between a surface and the bulk of a solution, in contact with said surface, **characterized** in that said solution is placed in a vessel suitable for centrifugation, and subjected to asymmetric heating, cooling and simultaneous centrifugation at conditions for creating a enhanced flow within said reaction mixture, wherein the asymmetric heating and cooling consists in the creation of a temperature difference between subsets of said reaction mixture and said flow ensures practically total mixing and homogenisation of the reaction mixture.

11. The method according to claim 10, wherein the asymmetric heating and cooling consists of the walls of the reaction vessel being cooled, while a portion of the reaction mixture is heated.

12. The method according to claim 10, wherein the central portion of the reaction mixture is heated while the walls of the reaction vessel are being cooled.

13. The method according to claim 10, wherein the reaction mixture is subjected to a centrifugal force exceeding 500 x g.

14. The method according to claim 10, wherein the reaction mixture is subjected to a centrifugal force in the interval of about 500 to about 20.000 x g.

15. The method according to claim 10, wherein the reaction mixture is subjected to a centrifugal force in the interval of about 1.500 to about 20.000 x g.

16. The method according to claim 10, wherein the reaction mixture is subjected to a centrifugal force in the interval of about 5.000 to about 15.000 x g.

17. The method according to claim 10, wherein the heating of a subset of the reaction mixture is performed by a method of heating chosen among an IR-source, and a microwave element.

18. The method according to claim 11, wherein the cooling of the walls of the reaction vessel is performed by convection cooling or the use of a circulating cooling medium.

19. A method for performing chemical synthesis, comprising the method of claim 1.

20. A method for performing chemical synthesis, comprising the method of claim 10.

21. A method according to claim 19 or 20, wherein the chemical synthesis is solid phase chemical synthesis.

22. A method for performing an assay, comprising the method of claim 1.

23. A method for performing an assay, comprising the method of claim 10.

24. A method according to claim 22 or 23, wherein the assay is a solid phase assay.

25. A method for rapid temperature inactivation in chemical reactions, wherein the reaction mixture is subjected to the method according to claim 1, the entire reaction mixture being rapidly brought to a temperature sufficient to perform the desired inactivation.

26. A device for performing the method according to claim 1, wherein said device has means for holding a vessel suitable for centrifugation, and means for subjecting said vessel to asymmetric heating, cooling and simultaneous centrifugation at conditions for creating an enhanced flow within said reaction mixture, wherein said flow ensures practically total mixing and homogenisation of the reaction mixture in said vessel.

27. A device for performing the method according to claim 10, wherein said device has means for holding a vessel suitable for centrifugation, and means for subjecting said vessel to asymmetric heating, cooling and simultaneous centrifugation at conditions for creating an enhanced mass transport between the bulk of reaction mixture and the surface of said vessel, wherein said flow ensures that the entire bulk of the reaction mixture repeatedly passes a defined location in the vessel.

28. A reaction vessel (1), the configuration of which takes into account the flow pattern achieved in said vessel during asymmetric heating and cooling during centrifugation.

29. The reaction vessel (1) according to claim 28, wherein said vessel has means (2, 3, 4, 5, 6, 7, 8, 9) capable of interaction with at least one component of the reaction mixture, placed at locations at the inner surface of the reaction vessel, corresponding to the collective down-ward flow or sink in said vessel.

30. A reaction vessel (1) according to claim 28, wherein said vessel has a shape or features (14) which aid in the positioning of said vessel so that the flow pattern achieved in said vessel during asymmetric heating and cooling thereof during centrifugation is accounted for, and so that the location of the collective down-ward flow or sink in said vessel can be controlled.

31. The reaction vessel according to any one of claims 28 - 30, wherein said reaction vessel is chosen among a centrifuge tube, a microtitre tube, a well in a microtitre plate, a volume defined in a device suitable for rotation, such as a platform for analysis in the CD-format.

32. The reaction vessel according to claim 29, wherein said means capable of interaction with at least one component of the reaction mixture are means chosen among mechanical means interacting with the flow, means for transferring heat, means for guiding light or radiation, arrays, defined areas, dots or spots with a chemical or biochemical component which interacts with a component in the reaction mixture.

33. An insert (9) for a reaction vessel (1) for use in a method according to claim 1 or claim 11, **characterized** in that said insert has means (10, 11, 12, 13) capable of interaction with at least one component of the reaction mixture, placed at locations at the surface of said insert, corresponding to the collective down-ward flow or sink in said vessel, when said insert is in place in said vessel.

34. The insert according to claim 33, wherein said means capable of interaction with at least one component of the reaction mixture are means chosen among mechanical means interacting with the flow, means for transferring heat, means for guiding light or radiation, arrays, defined areas, dots or spots with a chemical or biochemical component which interacts with a component in the reaction mixture.

35. A reaction vessel comprising, as a detachable or integrated part thereof, an insert according to any one of claims 33 - 34.
